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ABSTRACT

This study examined the efficacy of two educational practices designed to prevent learning difficulties in children from high risk families (N=64) during the first 8 years of life. The preventive treatments included: (1) educational daycare plus family education from birth to age 5 followed by a home/school resource program from kindergarten through second grade; or (2) identical family education but no educational daycare followed by the identical home/school program through second grade. Among findings are the following: the most intensely treated group consistently scored higher than the other two groups; over time the IQ and reading scores of all three groups decreased somewhat; there was a significant linear effect of time but no treatment and time interaction effects; an expected rise in academic achievement by the treatment groups from kindergarten to grade 2 was not realized; but significantly fewer of the children in the educational daycare group were retained in grade. (6 references) (DB)

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FINAL REPORT

to

Office of Special Education Programs

Grant Number: G008530163

Title: The Effectiveness of Preschool and School-age Intervention for Children at-risk for Learning Difficulties

Principal Investigator: Craig T. Ramey, Ph.D.

Frank Porter Graham Child Development Center
University of North Carolina at Chapel Hill

EC 301181

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Project Objectives

The overall purpose of this research was to determine the efficacy of two educational practices designed to prevent learning difficulties in children from high-risk families during the first 8 years of life. Learning difficulties include mild mental retardation without a known biological base; learning at a slower than average rate; and specific learning disabilites. The goal was to meet the educational needs of these high-risk children within their general educational setting. The preventive treatments included: 1) educational daycare plus family education from birth to age 5 followed by a home/school resource program from kindergarten through second grade or 2) identical family education but no educational daycare from birth to age 5 followed by the identical home/school program as in condition 1. Both of these conditions were compared to a randomly assigned high-risk control group which was reared without systematic educational intervention. This project, begun in 1977, has been co-funded by OSEP, NICHD, and ACYF. The present report covers the years 1985-88, during which time the children were involved in the home/school phase of the intervention.

Significance

This research was important for several reasons:

First, it was and continues to be the only intervention experiment employing random assignment designed to test interventions of two intensity levels, both of which, when completed, will have been continuous from birth to age 8. Thus, it will be possible to determine if learning difficulties, grade retentions, and/or special class placements can be prevented in the early elementary school years by adding preschool and school-age educational supplements to the general educational system. The research therefore provides a test of the feasibility and effectiveness of pooling the knowledge and skills of special and general educators within the context of primary prevention.

Second, the study concentrated on both the processes which antedate and mediate school performance as well as the outcome desired from early intervention (improved academic achievement). Such process or mediational-mechanism research is woefully missing from most first-generation intervention studies, but it is vitally important for creating more cost-effective early intervention programs in the future. Research on mediational mechanisms is needed in order to determine which psycho-educational processes are amenable to change through systematic intervention and hence worthy candidates for future educational attention.

Third, this research provided an extension and partial replication of previous research by the same investigators concerning both intensive preschool intervention and the special Home/School Resource Program.

Report of Methods Implemented in Project CARE

Subjects and Design

Beginning in November 1978 and extending to March 1980 (a 17 month period), we identified 64 high-risk families using the Ramey and Smith (1977) High-risk Index. Families determined to be at high risk were randomly assigned to one of three preschool treatment conditions: 1) Family Education, 2) Family Education plus Educational Daycare, or 3) an educationally untreated Control group. All families entered the project before their infants were 6 months old. Restriction of space in the infant nursery limited the number of high-risk families in Family Education plus Educational Daycare to 16; 25 and 23 families were randomly assigned to the Family Education and Control groups, respectively. Two families in the Family Education group had twins.

The average age of the mothers was approximately 21; fathers' ages averaged 25. Mothers' and fathers' education varied from 10.6 to 11.4 years of schooling across groups and mothers' Full Scale WAIS IQ scores were approximately 87 across groups. The families' risk status on the High-Risk Index (about 20 points) and average earned incomes ($7,600) were also quite similar. This pattern of characteristics, in the absense of systematic early intervention, has been established as indicative of later learning difficulties and school maladjustment (Ramey & Campbell, 1984; 1985; Ramey et al., 1984; Ramey & Haskins, 1981).

Each of the pre-kindergarten treatment conditions was implemented during the first five years of the child's life. As children entered public school, those in the two pre-kindergarten experimental groups received the same special Home/School Resource Program that was previously used in the Carolina Abecedarian Project.

Implementation of Intervention

The school-age intervention consisted of providing a Home/School Resource Teacher to each child and family in the two treatment groups. This teacher filled three roles: she prepared an individualized set of home activities designed to supplement the school's basic skills curriculum in reading and math and taught the parent how to use these activities at home with the child; she consulted with the classroom teacher to make sure that the home activities

supplemented the school curriculum in a timely manner; and she advocated for the child and family within the school and community.

Parents were visited every other week. The Home/School Resource Teacher had three goals for these visits: first, to let the parent know which skills were currently being stressed and to provide information to the parent concerning the child's progress in school; second, to deliver new activities designed to increase educational exposure and to help the child attain the current objectives; third, to serve as a channel of communication between the classroom teacher and the parent. By translating and transmitting information from school to home, the Home/School Resource Teacher helped the parent to function more effectively within the educational system -- to respond to teacher communications, to attend school conferences, or to advocate for the child. In her role as a model for the parents, the Home/School Resource Teacher tried to convey the importance of academic values and of parent participation in the child's academic program. She also helped the parents to understand why classroom teachers make certain demands or impose certain disciplinary actions upon the child.

Classroom teachers were visited on alternate weeks. At these times the classroom teacher identified current educational objectives for which the Home/School Resource Teacher designed supplemental curriculum activities. In addition, the Home/School Resource Teacher was available to the classroom teacher as a consultant for any educational or behavior problems the child had. Along with the classroom teacher, Home/School Resource Teachers advocated for the child within the school system to assure that needed special services were provided. Home/School Resource Teachers also served as channels of communication between the home and the classroom. This was particularly important in the case of low-income, high-risk families who lacked telephones or reliable means of transportation. Thus, the Home/School Resource Teacher was continually working between school and home, keeping each informed of progress and problems, and strengthening the relationship between the two. In addition to their role as liason between home and classroom during the academic year, the Home/School Resource Teachers also provided a variety of summer experiences in an attempt to prevent declines in the children's academic skills over the vacation period. These experiences have included providing a six week's intensive tutorial in reading, delivering summer activity packets, arranging for summer camp experiences, and taking children to the public library.

The Home/School intervention was in force for the first three years the child attended public school. By starting the school-age intervention at the very beginning of exposure to the system, the Home/School Resource Teacher was

available to aid the child in the transition and adaptation to the classroom. Intervention then continued during the time that children typically acquire the skills and attitudes necessary for successful adjustment to public school and the basic learning tools of reading and math that will undergird later curricula.

During the three years covered by this report the Home/School Resource Teachers averaged 142 visits per month. The following tabulation summarizes the types of visits and contacts for each of the three years.

Type	Year 1	Year 2	Year 3
Regular home visits	523	520	502
Special home visits	53	70	65
Attempted home visits	124	128	97
Regular school visits	576	604	579
Special school visits	45	126	123
Phone contacts	113	159	159

Regular visits were those that accomplished the ongoing goals of educational enhancement and communication between the home and school. Special visits were added or scheduled in response to unexpected needs or occurrences. They enabled the program to be especially responsive to rapidly-changing circumstances within the school or family.

The intervention content for each child and family was completely individualized -- designed in response to individual needs. As an example, the following three pages provide for one child (ID# 326) a record of the language arts and math skills that were requested by the Classroom Teacher and translated into supplementary home learning activities by the Home/School Resource Teacher. These pages are labled Table 1 and Table 2 and cover the time period from September 1985 to May 1986 for that <u>one</u> child.

Table 1

CARE -- YEAR 1
LANGUAGE ARTS SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

CHILD ID NUMBER= 326

	MONTH OF VISIT									
	SEP-85	OCT-85	NOV-85	DEC-85	JAN-86	FEB-86	MAR-86	APR-86	MAY-86	ALL
	N	N	N	N	N	N	N	N	N	N
LANGUAGE ARTS SKILL NEEDING WORK										
COLOR W/IN LINES	.	.	1	.	.	.	.	.	.	1
CUT CORRECTLY	1	.	1	.	.	.	.	.	.	2
POSITIONAL WORDS	.	2	.	.	.	.	.	.	.	2
LEFT AND RIGHT	.	1	.	.	.	.	.	.	.	1
NAMES COLORS	1	1	.	.	.	.	.	.	.	2
DIST. UNLIK OBJS	.	1	1	.	.	.	.	.	.	2
LIKE/UNLIKE SNDS	.	.	.	.	1	1	.	.	.	2
LT/RT MOVEMENTS	.	1	.	.	.	.	.	.	.	1
RHYMING SOUNDS	.	1	.	.	1	.	.	1	.	3
PICT SEQUENCE	.	.	.	.	.	.	1	.	.	1
CATEGORIZATION	.	1	.	.	.	.	.	.	.	1
UCASE RANDOM ORD	.	1	1	1	1	1	.	.	1	6
LCASE RANDOM ORD	.	1	1	1	1	1	.	.	1	6
PAIR U&LCASE LET	.	2	.	.	.	.	.	.	.	2
COLOR WORDS	.	.	.	.	.	.	1	.	.	1
CONSONANT SOUNDS	.	.	.	.	.	1	.	2	2	5
LETTER&INIT SOUND	.	.	.	.	.	1	4	.	.	5
IDENT. ANTONYMS	.	.	.	.	1	.	.	.	.	1
WRITES NUMERALS	.	.	.	.	1	.	.	.	.	1
COPIES NAME-M	.	.	.	.	.	.	2	.	.	2
PRINT 1ST NAME-M	1	.	.	.	.	.	.	.	.	1

(CONTINUED)

Table 1 (continued)

CARE -- YEAR 1
LANGUAGE ARTS SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

CHILD ID NUMBER= 326

	MONTH OF VISIT									
	SEP-85	OCT-85	NOV-85	DEC-85	JAN-86	FEB-86	MAR-86	APR-86	MAY-86	ALL
	N	N	N	N	N	N	N	N	N	N
LANGUAGE ARTS SKILL NEEDING WORK										
TRACE LW CASE	.	.	.	.	.	.	1	.	.	1
TRACES UP CASE-M	.	.	.	.	.	.	1	.	.	1
COPIES UP CASE-M	.	.	.	.	.	1	.	.	1	2
COPIES LW CASE-M	.	.	.	.	.	1	.	1	1	3
TRACES NAME-C	.	1	.	.	.	.	.	.	.	1

Table 2

CARE -- YEAR 1
MATH SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

CHILD ID NUMBER= 326

	MONTH OF VISIT									
	SEP-85	OCT-85	NOV-85	DEC-85	JAN-86	FEB-86	MAR-86	APR-86	MAY-86	ALL
	N	N	N	N	N	N	N	N	N	N
MATH SKILL NEEDING WORK										
NAME GEO SHAPES	.	.	1	.	.	1	.	.	.	2
MATCH = SETS	.	.	.	1	.	.	.	.	.	1
COMPLETE PATTERNS	.	1	.	.	.	.	.	.	.	1
COMPARE OBJECTS	.	.	.	2	.	.	.	.	.	2
DRAW GEO SHAPES	1	.	.	.	.	.	.	.	.	1
COUNT 1-10 OBJS	.	.	1	.	2	2	1	.	.	6
COUNT 10-20 OBJS	.	.	.	.	1	.	1	.	.	2
RECOGNIZES 1-10	.	.	.	.	.	.	.	.	1	1
RECOGNIZES 10-20	.	.	.	.	.	.	.	.	1	1
WRITES #S 1-10	.	.	.	.	1	1	1	.	1	4
WRITES #S 10-20	.	.	.	.	.	.	.	.	1	1
CTS&WRITES TOTAL	.	.	.	.	.	.	.	.	1	1
ADD 1 TO #(1-10)	.	.	.	.	.	.	.	.	1	1
ADD 1 DIGIT #S	.	.	.	.	.	.	.	1	.	1
SUB 1 DIGIT #	.	.	.	.	.	.	.	.	1	1
TELL TIME TO HR	.	.	.	.	.	.	1	.	.	1
MEASURE CM,M	.	.	.	.	.	.	.	.	1	1
NAME COINS,VALUE	.	.	.	.	.	.	.	2	.	2
COUNT COINS	.	.	.	.	.	.	.	1	.	1

The nine pages that follow summarize, for all Project CARE children, the frequency with which the various language arts and math skills were requested and used. Table 3 lists 1,619 requests for language arts skills in year 1, Table 4 lists 935 requests for math skills in year 1, Table 5 lists 1,475 requests for language arts skills in year 2, and Table 6 lists 1,169 requests for math skills in year 2. Similar records are available for year 3 of the project. Together, these demonstrate the specific-skill focus of the home visitation program.

Table 3

CARE -- YEAR 1

LANGUAGE ARTS SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

RSKILL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
COLOR W/IN LINES	30	1.9	30	1.9
DRAW PERSON	21	1.3	51	3.2
CUT CORRECTLY	39	2.4	90	5.6
POSITIONAL WORDS	34	2.1	124	7.7
PERSONAL INFO	1	0.1	125	7.7
LEFT AND RIGHT	16	1.0	141	8.7
1 STEP DIRECTNS	11	0.7	152	9.4
2+ STEP DIRECTNS	8	0.5	160	9.9
LISTEN-DIRECTNS	4	0.2	164	10.1
LISTEN-STORY	3	0.2	167	10.3
SIMPLE SENTENCES	2	0.1	169	10.4
MANY WORD ANSWER	2	0.1	171	10.6
COMPLEX SENTENCE	1	0.1	172	10.6
OWN EXPERIENCE	2	0.1	174	10.7
MATCHES COLORS	2	0.1	176	10.9
NAMES COLORS	25	1.5	201	12.4
MATCHES SHAPES	8	0.5	209	12.9
DIST. UNLIK OBJS	29	1.8	238	14.7
MATCHES NUMERALS	1	0.1	239	14.8
MATCHES LETTER	4	0.2	243	15.0
LIKE/UNLIKE SNDS	7	0.4	250	15.4
PARTS OF WHOLE	2	0.1	252	15.6
PICT W/IN GROUPS	2	0.1	254	15.7
LT/RT MOVEMENTS	4	0.2	258	15.9
RHYMING SOUNDS	61	3.8	319	19.7
PICT SEQUENCE	19	1.2	338	20.9
CATEGORIZATION	14	0.9	352	21.7
CORRECT REVERSAL	5	0.3	357	22.1
ABCs IN SEQUENCE	14	0.9	371	22.9
UCASE RANDOM ORD	116	7.2	487	30.1
LCASE RANDOM ORD	109	6.7	596	36.8
PAIR U&LCASE LET	101	6.2	697	43.1
READ 1 WORD	13	0.8	710	43.9
READ 2+ WORDS	3	0.2	713	44.0
MATCH WORD/PICT	4	0.2	717	44.3
READ WRD/PIC/OBJ	9	0.6	726	44.8
WRDS TO NUMBERS	2	0.1	728	45.0
FINDS WRDS TO #S	1	0.1	729	45.0
READS WRDS TO #S	11	0.7	740	45.7
LANG EXPER STORY	2	0.1	742	45.8
WORDS IN STORIES	8	0.5	750	46.3
COLOR WORDS	62	3.8	812	50.2
# WORDS ONE-TEN	37	2.3	849	52.4
PRE-PRI DOLCH	11	0.7	860	53.1
PHONETIC SUBSTIT	8	0.5	868	53.6
CONSONANT SOUNDS	166	10.3	1034	63.9
BLEND SOUNDS	2	0.1	1036	64.0
DIGRAPH SOUNDS	5	0.3	1041	64.3
DECODES WORDS	1	0.1	1042	64.4
LETTER&INIT SOUN	133	8.2	1175	72.6
SHORT SND OF A	15	0.9	1190	73.5
SHORT SND OF E	14	0.9	1204	74.4
SHORT SND OF I	11	0.7	1215	75.0

Table 3 (continued)

CARE -- YEAR 1
LANGUAGE ARTS SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

RSKILL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
SHORT SND OF O	9	0.6	1224	75.6
SHORT SND OF U	10	0.6	1234	76.2
LONG SND OF A	2	0.1	1236	76.3
LONG SND OF E	1	0.1	1237	76.4
LONG SND OF I	1	0.1	1238	76.5
FINAL CONSONANTS	18	1.1	1256	77.6
LONG/SHORT VOWEL	2	0.1	1258	77.7
GIVE PLURAL FORM	1	0.1	1259	77.8
CONTRACTIONS	1	0.1	1260	77.8
PICTURE CLUES	2	0.1	1262	77.9
WRD/IDEA CATEG.	1	0.1	1263	78.0
EVENTS OF STORY	3	0.2	1266	78.2
SEQUENCING IDEAS	3	0.2	1269	78.4
DRAWS CONCLUSION	1	0.1	1270	78.4
STATES MAIN IDEA	2	0.1	1272	78.6
RECALLS DETAILS	1	0.1	1273	78.6
IDENT. ADJECTIVE	1	0.1	1274	78.7
IDENT. ANTONYMS	20	1.2	1294	79.9
TRACING LINES	11	0.7	1305	80.6
DRAWS BET. LINES	3	0.2	1308	80.8
WRITES LT TO RT	7	0.4	1315	81.2
3 RELATED SENT.	1	0.1	1316	81.3
TRACES NUMERALS	14	0.9	1330	82.1
COPIES NUMERALS	8	0.5	1338	82.6
WRITES NUMERALS	62	3.8	1400	86.5
TRACES NAME-M	2	0.1	1402	86.6
COPIES NAME-M	6	0.4	1408	87.0
PRINT 1ST NAME-M	42	2.6	1450	89.6
PRINT LAST NAM-M	8	0.5	1458	90.1
TRACE LW CASE	11	0.7	1469	90.7
TRACES UP CASE-M	21	1.3	1490	92.0
COPIES UP CASE-M	30	1.9	1520	93.9
WRITES UP CASE-M	9	0.6	1529	94.4
COPIES LW CASE-M	31	1.9	1560	96.4
WRITES LW CASE-M	17	1.1	1577	97.4
LETTERS ON LINES	6	0.4	1583	97.8
TRACES WORDS-M	2	0.1	1585	97.9
COPIES WORDS-M	4	0.2	1589	98.1
WRITES WORDS-M	1	0.1	1590	98.2
TRACES NAME-C	3	0.2	1593	98.4
COPIES NAME-C	1	0.1	1594	98.5
MANUSCRIPT CORR	4	0.2	1598	98.7
STATE FULL NAME	5	0.3	1603	99.0
STATE PHONE #	4	0.2	1607	99.3
STATE HOME ADDR	6	0.4	1613	99.6
WRITE FULL NAME	2	0.1	1615	99.8
WRITE PHONE #	2	0.1	1617	99.9
WRITE ADDRESS	2	0.1	1619	100.0

Table 4

CARE -- YEAR 1
MATH SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

MSKILL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
MATCH GEO SHAPES	3	0.3	3	0.3
FIND GEO SHAPES	1	0.1	4	0.4
NAME GEO SHAPES	38	4.1	42	4.5
MATCH NUMERALS	7	0.7	49	5.2
MATCH = SETS	38	4.1	87	9.3
FIND = SETS	16	1.7	103	11.0
ID UN= SETS	5	0.5	108	11.6
COMPLETE PATTERN	28	3.0	136	14.5
COMPARE OBJECTS	26	2.8	162	17.3
DRAW GEO SHAPES	14	1.5	176	18.8
COUNT 1-10	23	2.5	199	21.3
COUNT 1-20	32	3.4	231	24.7
COUNT 1-50	11	1.2	242	25.9
COUNT 1-100	6	0.6	248	26.5
COUNT BY 10-100	3	0.3	251	26.8
COUNT BY 5 TO 10	2	0.2	253	27.1
COUNT BY 2 TO 10	1	0.1	254	27.2
NUMBER ORDER	3	0.3	257	27.5
COUNT 1-10 OBJS	133	14.2	390	41.7
COUNT 10-20 OBJS	33	3.5	423	45.2
COUNT 20-30 OBJS	5	0.5	428	45.8
COUNT 40-50 OBJS	1	0.1	429	45.9
COUNT 50-100 OBJ	5	0.5	434	46.4
CONCEPT OF ZERO	8	0.9	442	47.3
RECOGNIZES 1-10	120	12.8	562	60.1
RECOGNIZES 10-20	26	2.8	588	62.9
RECOGNIZES 20-30	3	0.3	591	63.2
RECOGNIZES 30-40	1	0.1	592	63.3
RECOGNIZES 40-50	1	0.1	593	63.4
RECOGNIZES 50-10	1	0.1	594	63.5
SEQUENCE, 1-10	17	1.8	611	65.3
SEQUENCE, 1-20	16	1.7	627	67.1
ORDINAL POSITION	7	0.7	634	67.8
WRITES #S 1-10	51	5.5	685	73.3
WRITES #S 10-20	31	3.3	716	76.6
WRITES BY 10-100	6	0.6	722	77.2
WRITES MISSING #	7	0.7	729	78.0
USES < AND >	14	1.5	743	79.5
EXPLAINS +	5	0.5	748	80.0
CTS&WRITES TOTAL	26	2.8	774	82.8
ADD 1 TO #(1-10)	19	2.0	793	84.8
ADD 1 DIGIT #S	30	3.2	823	88.0
ADD. FACTS,11-20	1	0.1	824	88.1
MISSING ADDEND	1	0.1	825	88.2
SUB 1 DIGIT #	10	1.1	835	89.3
SUB 1 D,NO REGRP	3	0.3	838	89.6
1 STEP WORD PRBS	1	0.1	839	89.7
TELL TIME TO HR	22	2.4	861	92.1
TELL TIME-1/2 HR	16	1.7	877	93.8
TELL TIME-1/4 HR	1	0.1	878	93.9
WRITE TIME TO HR	4	0.4	882	94.3
WRITE TIME-1/2HR	6	0.6	888	95.0
EXPLAIN AM/PM	2	0.2	890	95.2

Table 4 (continued)

CARE -- YEAR 1
MATH SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

MSKILL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
READS MOS OF YR	1	0.1	891	95.3
MEASURE CM,M	1	0.1	892	95.4
RULER DIVISIONS	5	0.5	897	95.9
YARDSTICK MARKS	1	0.1	898	96.0
INTERPRET GRAPHS	4	0.4	902	96.5
MATCH COINS	4	0.4	906	96.9
FIND COINS	7	0.7	913	97.6
NAME COINS,VALUE	17	1.8	930	99.5
COUNT COINS	4	0.4	934	99.9
COMBOS OF COINS	1	0.1	935	100.0

Table 5

CARE -- YEAR 2
LANGUAGE ARTS SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

LANGUAGE ARTS SKILL NEEDING WORK

RSKILL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
COLOR W/IN LINES	8	0.5	8	0.5
CUT CORRECTLY	6	0.4	14	0.9
POSITIONAL WORDS	1	0.1	15	1.0
PERSONAL INFO	1	0.1	16	1.1
1 STEP DIRECTNS	3	0.2	19	1.3
2+ STEP DIRECTNS	15	1.0	34	2.3
LISTEN-DIRECTNS	8	0.5	42	2.8
LISTEN-STORY	5	0.3	47	3.2
SIMPLE SENTENCES	2	0.1	49	3.3
MANY WORD ANSWER	2	0.1	51	3.5
OWN EXPERIENCE	3	0.2	54	3.7
NAMES COLORS	2	0.1	56	3.8
MATCHES SHAPES	4	0.3	60	4.1
DIST. UNLIK OBJS	6	0.4	66	4.5
MATCHES NUMERALS	1	0.1	67	4.5
MATCHES LETTER	3	0.2	70	4.7
LIKE/UNLIKE SNDS	2	0.1	72	4.9
LT/RT MOVEMENTS	1	0.1	73	4.9
RHYMING SOUNDS	34	2.3	107	7.3
PICT SEQUENCE	4	0.3	111	7.5
CATEGORIZATION	3	0.2	114	7.7
ABCs IN SEQUENCE	3	0.2	117	7.9
UCASE RANDOM ORD	12	0.8	129	8.7
LCASE RANDOM ORD	11	0.7	140	9.5
PAIR U&LCASE LET	20	1.4	160	10.8
MATCH 1 WORD	7	0.5	167	11.3
READ 1 WORD	80	5.4	247	16.7
READ 2+ WORDS	4	0.3	251	17.0
MATCH WORD/PICT	2	0.1	253	17.2
READ WRD/PIC/OBJ	4	0.3	257	17.4
READS WRDS TO #S	7	0.5	264	17.9
LANG EXPER STORY	5	0.3	269	18.2
WORDS IN STORIES	149	10.1	418	28.3
COLOR WORDS	41	2.8	459	31.1
# WORDS ONE-TEN	15	1.0	474	32.1
PRE-PRI DOLCH	9	0.6	483	32.7
PRIMARY DOLCH	12	0.8	495	33.6
READ #WORDS 1-20	1	0.1	496	33.6
PHONETIC SUBSTIT	17	1.2	513	34.8
CONSONANT SOUNDS	80	5.4	593	40.2
BLEND SOUNDS	59	4.0	652	44.2
DIGRAPH SOUNDS	24	1.6	676	45.8
BLEND CONS+VOWEL	5	0.3	681	46.2
DECODES WORDS	2	0.1	683	46.3
LETTER&INIT SOUN	64	4.3	747	50.6
SHORT SND OF A	38	2.6	785	53.2
SHORT SND OF E	34	2.3	819	55.5
SHORT SND OF I	34	2.3	853	57.8
SHORT SND OF O	23	1.6	876	59.4
SHORT SND OF U	21	1.4	897	60.8
LONG SND OF A	17	1.2	914	62.0

Table 5 (continued)

CARE -- YEAR 2
LANGUAGE ARTS SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

LANGUAGE ARTS SKILL NEEDING WORK

RSKILL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
LONG SND OF E	13	0.9	927	62.8
LONG SND OF I	12	0.8	939	63.7
LONG SND OF O	8	0.5	947	64.2
LONG SND OF U	7	0.5	954	64.7
FINAL CONSONANTS	30	2.0	984	66.7
VOWEL PATTERNS	7	0.5	991	67.2
LONG/SHORT VOWEL	27	1.8	1018	69.0
COMPOUND TO ROOT	18	1.2	1036	70.2
SUFFIX FROM ROOT	14	0.9	1050	71.2
GIVE PLURAL FORM	25	1.7	1075	72.9
DOUBLE CONS ENDS	7	0.5	1082	73.4
WORD TO SYLLABLE	1	0.1	1083	73.4
CONTRACTIONS	27	1.8	1110	75.3
COMPA/SUPERLATIV	4	0.3	1114	75.5
WRD/IDEA CATEG.	3	0.2	1117	75.7
EVENTS OF STORY	17	1.2	1134	76.9
SEQUENCING IDEAS	10	0.7	1144	77.6
ANTICIPATES END	4	0.3	1148	77.8
DRAWS INFERENCES	4	0.3	1152	78.1
DRAWS CONCLUSION	5	0.3	1157	78.4
STATES MAIN IDEA	14	0.9	1171	79.4
RECALLS DETAILS	4	0.3	1175	79.7
WITH EXPRESSION	7	0.5	1182	80.1
ALPHA BY 1ST	13	0.9	1195	81.0
ALPHA WORD-1ST	3	0.2	1198	81.2
ALPHA WORD-2ND	6	0.4	1204	81.6
ALPHA WORD-3RD	1	0.1	1205	81.7
TABLE OF CONTENT	2	0.1	1207	81.8
STUDIES SPELLING	14	0.9	1221	82.8
IDENTIFIES NOUNS	4	0.3	1225	83.1
IDENT. PRONOUNS	8	0.5	1233	83.6
POSSESIVE PRON.	1	0.1	1234	83.7
IDENTIFIES VERBS	4	0.3	1238	83.9
CORR. POSS NOUNS	6	0.4	1244	84.3
IDENT. ADJECTIVE	1	0.1	1245	84.4
IDENT. SYNONYMS	5	0.3	1250	84.7
IDENT. HOMONYMS	10	0.7	1260	85.4
IDENT. ANTONYMS	14	0.9	1274	86.4
CAPS 1ST WORDS	11	0.7	1285	87.1
CAP PROPER NOUNS	5	0.3	1290	87.5
CORR USE PERIOD	14	0.9	1304	88.4
CORR USE OF ?	9	0.6	1313	89.0
CORR USE OF !	2	0.1	1315	89.2
SUBJ/VERB AGREE	6	0.4	1321	89.6
QUOTATION MARKS	4	0.3	1325	89.8
DRAWS BET. LINES	3	0.2	1328	90.0
WRITES LT TO RT	8	0.5	1336	90.6
SUBJ./VERB SENT.	22	1.5	1358	92.1
PUNCTUATION	5	0.3	1363	92.4
3 RELATED SENT.	6	0.4	1369	92.8
CORR LETTER FORM	3	0.2	1372	93.0

Table 5 (continued)

CARE -- YEAR 2
LANGUAGE ARTS SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

LANGUAGE ARTS SKILL NEEDING WORK

RSKILL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
TRACES NUMERALS	2	0.1	1374	93.2
COPIES NUMERALS	1	0.1	1375	93.2
WRITES NUMERALS	21	1.4	1396	94.6
COPIES NAME-M	1	0.1	1397	94.7
PRINT 1ST NAME-M	3	0.2	1400	94.9
PRINT LAST NAM-M	1	0.1	1401	95.0
TRACE LW CASE	4	0.3	1405	95.3
TRACES UP CASE-M	7	0.5	1412	95.7
COPIES UP CASE-M	6	0.4	1418	96.1
WRITES UP CASE-M	6	0.4	1424	96.5
COPIES LW CASE-M	9	0.6	1433	97.2
WRITES LW CASE-M	7	0.5	1440	97.6
LETTERS ON LINES	4	0.3	1444	97.9
TRACES WORDS-M	1	0.1	1445	98.0
COPIES WORDS-M	11	0.7	1456	98.7
COPIES NAME-C	1	0.1	1457	98.8
WRITES NAME-C	2	0.1	1459	98.9
MANUSCRIPT CORR	6	0.4	1465	99.3
STATE PHONE #	2	0.1	1467	99.5
STATE HOME ADDR	5	0.3	1472	99.8
WRITE FULL NAME	2	0.1	1474	99.9
WRITE ADDRESS	1	0.1	1475	100.0

Table 6

CARE -- YEAR 2
MATH SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

MATH SKILL NEEDING WORK

MSKILL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
FIND GEO SHAPES	2	0.2	2	0.2
NAME GEO SHAPES	10	0.9	12	1.0
MATCH NUMERALS	1	0.1	13	1.1
MATCH = SETS	9	0.8	22	1.9
FIND = SETS	8	0.7	30	2.6
ID UN= SETS	1	0.1	31	2.7
COMPLETE PATTERN	8	0.7	39	3.3
COMPARE OBJECTS	11	0.9	50	4.3
DRAW GEO SHAPES	3	0.3	53	4.5
COUNT 1-10	4	0.3	57	4.9
COUNT 1-20	4	0.3	61	5.2
COUNT 1-50	3	0.3	64	5.5
COUNT 1-100	2	0.2	66	5.6
COUNT BY 10-100	4	0.3	70	6.0
COUNT BY 5 TO 10	6	0.5	76	6.5
COUNT BY 2 TO 10	4	0.3	80	6.8
NUMBER ORDER	2	0.2	82	7.0
COUNT 1-10 OBJS	22	1.9	104	8.9
COUNT 10-20 OBJS	11	0.9	115	9.8
COUNT 20-30 OBJS	3	0.3	118	10.1
COUNT 30-40 OBJS	2	0.2	120	10.3
COUNT 40-50 OBJS	1	0.1	121	10.4
COUNT 50-100 OBJ	1	0.1	122	10.4
RECOGNIZES 1-10	22	1.9	144	12.3
RECOGNIZES 10-20	18	1.5	162	13.9
RECOGNIZES 20-30	2	0.2	164	14.0
RECOGNIZES 30-40	2	0.2	166	14.2
RECOGNIZES 40-50	2	0.2	168	14.4
RECOGNIZES 50-10	1	0.1	169	14.5
SEQUENCE, 1-10	4	0.3	173	14.8
SEQUENCE, 1-20	5	0.4	178	15.2
ORDINAL POSITION	13	1.1	191	16.3
WRITES #S 1-10	46	3.9	237	20.3
WRITES #S 10-20	10	0.9	247	21.1
WRITES MISSING #	17	1.5	264	22.6
USES < AND >	9	0.8	273	23.4
EXPLAINS +	5	0.4	278	23.8
CTS&WRITES TOTAL	15	1.3	293	25.1
ADD 1 TO #(1-10)	24	2.1	317	27.1
ADD 1 DIGIT #S	171	14.6	488	41.7
ADD COL-1 DIG #S	9	0.8	497	42.5
ADD. FACTS,11-20	33	2.8	530	45.3
ADD 2+ PLACE #S	54	4.6	584	50.0
2+PLACE #S,REGRP	3	0.3	587	50.2
ADD 3+ COLUMNS	17	1.5	604	51.7
USE NUMBER LINE	4	0.3	608	52.0
MISSING ADDEND	6	0.5	614	52.5
SUB 1 DIGIT #	103	8.8	717	61.3
SUB 1 D,NO REGRP	51	4.4	768	65.7
SUB 2+, NO REGRP	57	4.9	825	70.6
SUB 2+, W/ REGRP	9	0.8	834	71.3

Table 6 (continued)

CARE -- YEAR 2
MATH SKILLS TO BE WORKED ON
REQUESTED DURING REGULAR SCHOOL VISITS

MATH SKILL NEEDING WORK

MSKILL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1 STEP WORD PRBS	7	0.6	841	71.9
RELAT BET +/-	15	1.3	856	73.2
SOLVE BOTH +/-	5	0.4	861	73.7
PLACE VALUE-1,10	53	4.5	914	78.2
PL VAL-1,10,100	1	0.1	915	78.3
TELL TIME TO HR	49	4.2	964	82.5
TELL TIME-1/2 HR	50	4.3	1014	86.7
WRITE TIME TO HR	5	0.4	1019	87.2
WRITE TIME-1/2HR	5	0.4	1024	87.6
NAMES DAYS OF WK	6	0.5	1030	88.1
NAMES MOS OF YEA	6	0.5	1036	88.6
READS DAYS OF WK	1	0.1	1037	88.7
READS MOS OF YR	1	0.1	1038	88.8
MEASURE CM,M	12	1.0	1050	89.8
RULER DIVISIONS	15	1.3	1065	91.1
YARDSTICK MARKS	5	0.4	1070	91.5
INTERPRET GRAPHS	3	0.3	1073	91.8
2 PINTS=1 QUART	2	0.2	1075	92.0
MATCH COINS	2	0.2	1077	92.1
FIND COINS	3	0.3	1080	92.4
NAME COINS,VALUE	27	2.3	1107	94.7
COUNT COINS	27	2.3	1134	97.0
COUNTS CURRENCY	3	0.3	1137	97.3
CT COIN&CURRENCY	1	0.1	1138	97.3
COMBOS OF COINS	12	1.0	1150	98.4
FRACTIONAL PART	19	1.6	1169	100.0

Measurement and Assessment

An extensive battery of tests and measures was administered following the protocol presented in the original and continuation grant proposals. These measures were selected to represent elements in Walberg's (1984) Model of Educational Productivity: aptitude, instruction, environment, and learning outcomes. The learning outcomes were further subdivided into affective, behavioral, and cognitive domains.

At the time the children entered public school kindergarten, 59 of the original 66 (or 89%) were still participating in Project CARE. They were assessed on-schedule during each of their first three years of elementary school experience. The oldest children finished their third year in public school in June 1986. The second wave of children completed their third year in June 1987. The last wave of children completed their third year and participated in the end-point assessments in June of 1988. In the late summer and fall of 1988, the entire data file from the three waves of children was cleaned and analyses were begun. The complex analysis of process and mediational mechanisms will continue after the granting period throughout 1989.

For this final report, basic findings in the cognitive domain are presented. Table 7 presents Wechsler IQ Scores at ages 60, 78, and 96 months. Tables 8 and 9 present, respectively, reading and mathematics achievement scores from the spring testing in each of the first three years of school.

Table 7
Wechsler IQ Scores at Three Ages
for Three Intervention Groups

Groups		Ages		
		60 mos.	78 mos.	96 mos.
Daycare + Family Education + H/S Resource	m	105.1	103.4	99.6
	s.d.	(8.0)	(14.3)	(13.2)
	n	13	13	13
Family Education + H/S Resource	m	93.3	93.8	89.4
	s.d.	(13.0)	(13.0)	(10.2)
	n	24	23	24
Untreated Control	m	96.9	96.0	93.2
	s.d.	(15.9)	(15.1)	(14.6)
	n	21	23	22

Wechsler IQ Scores at Three Ages
for Three Intervention Groups

Analysis of Variance

Source	df	F	p
Group	2,51	3.35	.0429
Time	2,50	7.84	.0011
Group*Time	4,100	0.25	.91

Table 8
Woodcock-Johnson Reading Achievement
Standard Scores
for Three Intervention Groups

Groups		Years in School		
		Yr 1	Yr 2	Yr 3
Daycare + Family Education + H/S Resource	m	104.0	105.5	97.7
	s.d.	(10.8)	(12.3)	(9.5)
	n	14	13	13
Family Education + H/S Resource	m	96.3	91.5	89.1
	s.d.	(10.4)	(15.3)	(14.4)
	n	24	25	25
Untreated Control	m	99.9	97.1	94.5
	s.d.	(13.8)	(18.7)	(14.9)
	n	21	21	23

Woodcock-Johnson Reading Achievement
Age Percentile Scores
for Three Intervention Groups

Groups		Years in School		
		Yr 1	Yr 2	Yr 3
Daycare + Family Education + H/S Resource	m	57.6	62.2	45.3
	s.d.	(20.7)	(26.4)	(21.8)
	n	14	13	13
Family Education + H/S Resource	m	41.9	34.5	29.9
	s.d.	(24.0)	(28.5)	(27.0)
	n	24	25	25
Untreated Control	m	49.0	44.2	41.0
	s.d.	(27.2)	(33.7)	(25.6)
	n	21	21	23

Table 9
Woodcock-Johnson Math Achievement
Standard Scores
for Three Intervention Groups

Groups		Years in School		
		Yr 1	Yr 2	Yr 3
Daycare + Family Education + H/S Resource	m	98.8	106.8	100.2
	s.d.	(16.9)	(16.0)	(11.8)
	n	14	13	13
Family Education + H/S Resource	m	91.1	95.6	91.3
	s.d.	(12.3)	(16.2)	(16.0)
	n	24	25	25
Untreated Control	m	95.0	101.1	98.0
	s.d.	(17.2)	(17.3)	(19.4)
	n	21	21	23

Woodcock-Johnson Math Achievement
Age Percentile Scores
for Three Intervention Groups

Groups		Years in School		
		Yr 1	Yr 2	Yr 3
Daycare + Family Education + H/S Resource	m	43.0	62.7	49.8
	s.d.	(29.3)	(29.5)	(25.0)
	n	14	13	13
Family Education + H/S Resource	m	31.0	43.2	34.4
	s.d.	(25.3)	(30.0)	(29.8)
	n	24	25	25
Untreated Control	m	38.7	53.5	49.3
	s.d.	(31.9)	(34.8)	(31.1)
	n	21	21	23

As can be seen in Table 7, repeated measures analyses of variance confirmed that there was a significant effect of treatment group ($p < .04$) and a significant linear effect of time ($p < .001$) with no treatment*time interaction. The most intensely treated group (Daycare + Family Education + Home/School Resource) consistently scored higher than the other two groups, and, over time, the scores of all three groups decreased somewhat. Tukey contrasts showed that the Daycare + Family Education + Home/School Resource Group was higher than the Family Education + Home/School Resource Group at 60 months of age ($p < .05$). At the final measurement point, 96 months, the mean IQ for the Daycare + Family Education + Home/School Resource Group (99.6) was at the national average (100).

Similar to the IQ results, reading achievement scores showed significant treatment group ($p < .05$) and time ($p < .002$) effects, but no interaction effects. Daycare + Family Education + Home/School Resource children scored at the national average on the Woodcock-Johnson reading standard score with children in the Control group scoring slightly lower, and Family Education + Home/School Resource children scoring lowest of all. In precentile terms, this means that the Daycare and Control groups scored at about the 50th percentile on reading achievement while the Family Education + Home/School Resource Group was at about the 30th to 40th precentile. All groups showed a slight decrease over time.

Repeated measures analysis of variance on the math achievement scores showed no significant group effect, but did show a significant effect of time ($p < .03$). There was no time*group interaction. The time effect was quadratic ($p < .01$) with Year 2 math scores for all groups higher than Years 1 or 3.

In the original research proposal we hypothesized trends in the first three years of public school for each of the groups of children studied. For the pre-kindergarten Educational Daycare + Family Education group, we expected that the Home/School Resource Program would "protect" the gains that were made during the pre-K years and thus to prevent a "wash-out" effect similar to that found in Head Start and in the group that did not receive school-age follow-up in our own Abecedarian Project. This expectation was partially realized -- with intelligence and standard achievement scores remaining in the 100's and high 90's for this group (see Tables 7, 8, and 9). However, these higher scores are somewhat mitigated by the fact that the time effects of declining IQ and Reading scores were seen for all three groups.

For the pre-kindergarted Family Education + Home/School Resource Group we expected a gradual rise in academic

achievement from Kindergarten to second grade, and for the Control group we expected a gradual decline in academic achievement over the three years of elementary school. The hoped-for rise in achievement was not seen, and the fact that the time effects were the same for all groups suggests that the decline seen in the Control Group was not of the nature predicted. It will be useful in future analyses to determine to what degree these time trends are the artifacts of norming (e.g. the higher scores in Year 2 math achievement) or from the switch from one test to another at various ages (e.g. the WIPPSI at age 5 and the WISC at ages 6 and 7).

These group and time results leave the contribution of the Home/School Resource Program in question. It is not clear what role, if any, it plays in the sustaining of intervention gains established in the pre-school period. Additional analyses of these data plus the anaylses of data from other areas will be needed to understand the role of Home/School Resource follow-up in the early years of public schooling.

In contrast, the role of the preschool Daycare component of the intervention is supported by the preceding data and by other data sources. Another analysis combined data from 1) records that showed that some of the Control and Family Education children had attended community (non-FPG) day care, 2) records of grade retention determined at the end of the first two years of school and 3) the Classroom Behavior Inventory, a rating including scales of task-orientation and independence. This analysis created three new groups: those who received educational daycare from FPG, those who received community daycare (of lesser quality), and those who received little or no daycare in the preschool years.

Comparing the proportion of school failure among the three groups based on daycare experience revealed a linear trend ($X^2(1)=5.54$, $p=.02$). Only two children (12%) in the educational daycare group were retained in grade, while 28% of children with > 15 months of community daycare failed, and 50% of the children with little or no daycare failed.

A further analysis examined the predictors of retention among the 44 children who were not in the FPG educational daycare group. The five predictors were: number of months in center-based daycare, age at entry into school, reading achievement, task-orientation, and independence.

Children who were <u>not</u> retained in either of their first two years of school (N=26) scored significantly higher across the selected predictors ($F(5,38)=3.6$, $p=.009$). Retainees (N=18) scored lower on reading achievement scores ($p=.03$), lower on independence ($p=.08$), were younger

(p=.09), and had spent fewer months in daycare (p=.06) than children who were not retained. (See Table 10.)

The high proportion (41%) of children in the comparison groups who were retained in one of the first years is a further validation of their "risk" status, which had been determined seven years earlier. That achievement scores significantly predict retention indicates that teachers do rely on academic progress, not just age or risk status when making retention decisions. Although the prediction was statistically marginal, retainees had attended daycare half as long, on average, as non-retainees. Most of the daycare centers attended by these children met State standards, but none provided the most advantageous ratios, curriculum, and staff that would be found in a university-based daycare center. They were centers of the type typically available to low-income families. Attendance at such centers as well as at univerisity-based centers may enhance the chances of a high-risk child progressing normally through the early grades

Table 10
Means and SDs of Variables Used to Predict School Failure

	Repeaters (N=17)		Non-repeaters (N=27)	
	M	SD	M	SD
Months in daycare before kindergarten entry	15.6	19.5	27.3	20.0
Reading achievement score (spring of kindergarten)	396.7	7.5	405.2	13.8
Teacher rating of task-orientation	2.7	7.4	5.4	6.0
Teacher rating of independence	5.9	7.3	9.5	6.1

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